PERSONAL COMPUTERS: PERSPECTIVES AND USE IN LARGE COMPANIES

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EXHIBITS

I INTRODUCTION

I   INTRODUCTION

- This report sums up current forces in the personal computer marketplace and describes the use of personal computers in large companies such as the:

  - Fortune 500.

  - Top 100 life and/or general insurance companies.

  - Top 100 commercial and/or savings banks.

- Personal computers are expected to find their largest market during the eighties in small businesses - those businesses with less than 500 employees.

  - Large businesses will be a major market for these systems also.

- Personal computers in this report include those selling for less than $15,000.

  - This includes the TRS-80, Apple, and Commodore systems at the low end.

  - The high end includes the IBM 5110 and 5120, the Datapoint 1500, and the Wang PCS II.

- While the high-end systems are not personal computers in a very personal sense they are systems that are used individually sometimes and are usually shared by a relatively small group of functionally related people.

    - The systems at the low end of the range are usually shared by a small group of people rather than being used by a single individual.

    - Both types of systems had no dedicated staff assigned to them.

- In this report, the use of personal systems in four departments in large companies is described:

    - Financial.

    - Marketing.

    - Manufacturing.

    - Planning.

- Sets of general applications useful in many departments are also described.

II MARKET TRENDS

II   MARKET TRENDS

A.   THE CHANGING MARKETPLACE

- Personal computers were originally sold as a retail product to hobbyists.

    - As microcomputers grew to microsystems, homeowners and small businesses were recognized as large markets.

    - The corporate market was the last to be targeted, and it will probably turn out to be the easiest to sell and the largest growth market in the near term.

- Exhibit II-I illustrates the typical life cycle of a retail product and some of the characteristics of the market at the various stages.

    - The hobbyist market grew quickly and is now considered to be in a late growth stage.

    - The other markets - homeowners, small businesses, and large company departments - are all in the introductory stage.

        . The introductory stage for homeowners and personal computers is apt to be a drawn-out period.

EXHIBIT II-1

RETAIL PRODUCT LIFE CYCLE
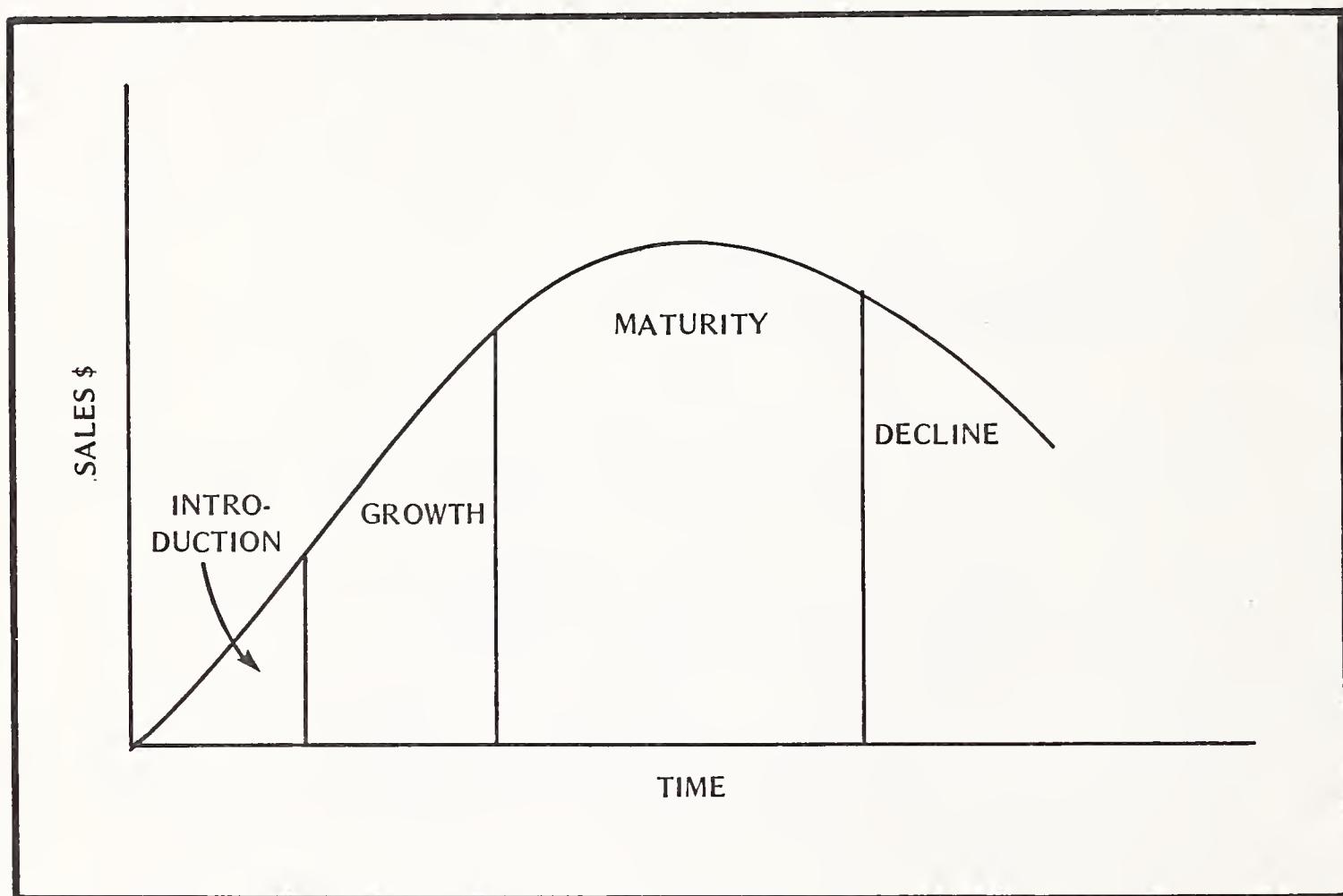
STRATEGY VARIABLE	INTRODUCTION	GROWTH	MATURITY	DECLINE
TARGET MARKET	HIGH INCOME INNOVATORS	MIDDLE INCOME ADOPTERS	MASS MARKET	LOW INCOME AND LAGGARDS
PRODUCT	ONE BASIC MODEL	SOME VARIETY	GREATER VARIETY	A FEW STANDARD MODELS
DISTRIBUTION	LIMITED OR EXTENSIVE	MORE OUTLETS	MORE OUTLETS	FEWER OUTLETS
PRICE	PENETRATION OR SKIMMING	WIDE RANGE	LOWER PRICES	LOWER PRICES
PROMOTION	INFORMATIVE	PERSUASIVE	COMPETITIVE	LIMITED

- The two business markets will grow rapidly and move into the growth stage before 1984.

- INPUT has forecast that the large company market for personal systems selling for less than $15,000 will have an installed base by 1985 of 600,000 systems valued at $4.8 billion, as shown in Exhibit II-2.

  - This forecast is a conservative one considering the current level of corporate EDP acceptance.

    - However, if applications packages do not become available the forecast may be optimistic.

- Others have forecast a total installed base of three million personal systems by 1985.

  - Apple's latest quarterly report shows that 250,000 systems have been sold.

- Personal computers used in the corporate environment tend to be larger versions of the available personal computer product line.

  - Most systems have maximum internal memory, at least one random access file device, and a good printer. This keeps the price high, in the $5,000 to $8,000 range.

- Recognizing the size of the corporate market and considering the large company their traditional domain, both IBM and Xerox have announced marketing programs for selling their personal computers directly to large companies. Other end users will be reached through a variety of distribution channels.

EXHIBIT II-2

MARKET FORECAST FOR

PERSONAL COMPUTERS (UNDER $15,000) IN LARGE

CORPORATIONS, 1980-1985

ITEM	1980 (BASE)	1981	1982	1983	1984	1985	AAGR 1980-1985 (percent)
Installed Base (thousands)	85	125	185	275	400	600	48%
Shipments (thousands)	–	40	60	90	125	200	38%
Value: Installed Base ($ millions)	$850	$1,150	$1,600	$2,300	$3,300	$4,800	41%
Value: Shipments ($ millions)	–	$300	$450	$700	$1,000	$1,500	38%

- Apple and Tandy, early entrants at the retail end of the personal computer market, have initiated direct sales efforts to large companies.

- A large number of small software houses have sprung up to supply the market with programs. These companies generally aim their products at homeowners, games enthusiasts, and small businesses where the entré is easier.

  - Very few have products aimed at corporate users.

- Software publishing houses are new companies created to mass market programs written by the computing public.

  - Their role is similar to a book publisher's role. They evaluate the product for market appeal, package and enhance it, and then market it to the widest possible audience.

  - They currently offer little to the corporate user.

B.   THE DRIVING FORCES IN THE LARGE COMPANY MARKET

- Research in 1980 developed one major and several minor driving forces leading potential corporate users to personal systems. Since that time, the introduction of more versatile systems by the major computer companies has changed some of the motivations.

  - Exhibit II-3 compares the reasons given for being interested in personal systems in early 1980 with the current set of motivations.

- Eighteen months ago the prime reason corporate users turned toward personal systems was the delay in getting their applications programmed at the corporate data center.

EXHIBIT II-3

POTENTIAL USERS' MOTIVATIONS FOR ACQUIRING
A PERSONAL COMPUTER SYSTEM

SPRING 1980*	FALL 1981*
– Dissatisfaction with in-house computer service	– Corporate advocacy programs
– Curiosity and ease of justification	– Application packages available
– Outside T/S service was getting expensive	– Dissatisfaction with in-house computer service
– Cost efficient for application	– RCS costs increasing

* IN ORDER OF IMPORTANCE

-     Delays of two years were found to be not uncommon.

●   The state of dissatisfaction has not significantly changed. What has changed is the corporate attitude toward personal systems, and that changed attitude is currently generating the sales to large corporations.

-     In addition, personal computer manufacturers have awakened to the existence of a corporate market and are organizing marketing groups for this particular segment.

-     Also, two major information systems companies (Xerox and IBM) have announced personal systems and specifically targeted the large company market - their traditional stronghold.

●   Corporate programs are currently taking three forms:

-     Outright bulk purchase of systems which are then given to specific groups within the company along with a basic application or set of applications.

    .   A brokerage house recently bought a number of systems from a major manufacturer and issued one to each securities analyst in the company.

-     Training and enlightenment programs for all who are interested in personal systems.

    .   Hardware and software classes are held and help is given in defining the application and justifying the system.

    .   Guidelines are issued defining "acceptable" systems, with the realization that at some future not-too-distant time the personal system users will want to communicate with each other or with the main system.

- Financial incentives such as discounts and easy payroll deduction plans encouraging employees to personally buy the systems.

    . Employees will train themselves and be prepared when the companies buy the system.

    . Many employees bring the systems into work to use after home use interest fades.

- The existence of corporate programs implies that the company has been convinced that the personal system can be efficient in certain applications with a real cost benefit.

- The curious always make up some portion of the sales in a new market and as their enthusiasm spreads so do sales.

    - While this usually does not lead to significant sales in the personal computer environment, these people open the door in many large companies.

        . The very low cost of basic personal systems has made it easy for people to hide the purchase of such systems in other places in the budget.

- While time dulls the curious it also provides a window for applications programs to be written.

    - Corporate users are interested in buying as finished a tool as possible as an aid in doing their job.

- When timesharing services first became available, they were sold directly to the end user with very little corporate control.

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- At some point, management looked at the total T/S costs and clamped down, instructing the DP group to provide the service and permitted outside T/S only when the need could not be supplied in-house within the required timeframe.

    . From there, outside RCS business grew again.

- EDP management in many companies is trying to avoid a repetition of the T/S act.

    - Personal computer use is growing in many companies without EDP being aware of its existence.

    - EDP realizes that at some point corporate management will put together the overall expenses and ask EDP management for an explanation.

        . In order to prevent that scenario from occurring, EDP management in an increasing number of companies is encouraging the exploration of the use of personal systems and thereby maintaining some control over their proliferation.

- Increasing corporate EDP activism in the area of individual computing will power the marketplace for the next two years provided current seeding proves cost effective.

- Having the right applications software for each end user is another important force in the corporate marketplace.

    - Users of personal computers do not want to learn to program nor are they very interested in computers. Users simply want an easy-to-use tool that will make their job easier.

- Users look at their jobs as unique; if they were writing the application program, they would create a very specific program that could not be used by anyone else.

- The key is to find a method of writing generalized applications that can be user modified to meet "unique" requirements.

- Application programs will sell systems. The user will buy the "right" package and accept whatever hardware it runs on, assuming the total cost is reasonably competitive.

- Personal system users feel the system should be reliable, easy to use, and cost effective.

  - These users think of the system as a processing tool much as they look at the telephone as a communications tool.

  - If something is wrong, the users want to make one phone call to get the system fixed.

    - That phone call should go to the EDP department, according to the users.

  - Users feel the EDP department should:

    - Supply the system.

    - Supply the applications programs.

    - Take care of all maintenance.

    - Provide a spare system in case of major failure.

    - Train the users.

.   Evaluate competitive systems.

-       This attitude may complicate the selling picture for those that have
applications directed toward specific departments.

III APPLICATIONS ANALYSIS BY DEPARTMENT

III APPLICATIONS ANALYSIS BY DEPARTMENT

- Specific applications are the key to this marketplace. Personal systems will be most useful if they can do a few very specific jobs without the mass of red tape and justifications usually associated with initiating a new application.

- Microcomputer system usage in very large companies is still in the exploratory stage.

  - The users of the initial systems were pioneers who had to learn much more about computers than they originally planned and also much more than today's user.

  - Many of the initial users bought the systems personally and then brought their systems into the office when home use turned trivial.

- Though applications packages designed to be run on today's personal systems are more readily available today than even six months ago, the large majority of the packages are aimed at small businesses rather than at the corporate user.

- This section of the report describes applications by major departments within a large company.

- The primary research was carried out in the manufacturing, banking, and insurance industries with supplementary material being drawn from other industries.

A.   COMMON APPLICATIONS

I.   UTILITY PROGRAMS

- Some applications that are common to most departments and most industries can almost be considered utility programs.

    - These programs are also used by small businesses as well as departments within large companies.

    - The prime example of this type of application package is Visicalc®. Visicalc® is a tool that can be used for many specific applications. Visicalc® permits the user to define relationships between the elements of a crossfooted worksheet so that a change in one element is automatically and consistently carried through the entire matrix. This tool permits the users to ask a series of "what if" questions and immediately see the results.

    - Visicalc® is the largest selling software package in history.

    - Recently, similar programs with expanded functions have been announced for specific systems. If they are accepted then they will be converted to additional systems.

- Visicalc® is an essential element in a broad class of applications that fall under the grouping called "modeling and forecasting."

- Modeling and forecasting were the most commonly mentioned "applications" by users or potential users of personal systems in large companies.

- Modeling and forecasting cover a vast range of applications that frequently work together.

  - Once an acceptable model of some operation is built then the elements can be manipulated to forecast behavior under the new conditions.

  - When models of the economy, a multinational corporation, or just a large corporation are built, hundreds of interrelationships must be described and very large computers are required.

  - Models of more mundane subjects such as a specific operation within the production process of a particular product or the teller department in a branch of a bank are less global in scope and are manageable by an individual.

  - These models:

    . Are predictive, answering "what if" questions.

    . Fit within a personal computer.

    . Aid an individual or small department perform one aspect of a job more efficiently.

- Statistical programs constitute another set of application utility programs that are used across industries and departments.

  - The amount of data, the size of arrays, etc. are limited on many personal systems; however, small department use frequently limits the amount of data sufficiently so that personal systems are more than adequate.

- In addition to the usual set of statistical tests and analysis programs, extensive packages of curve-fitting routines are desired.

  - These are generally used as part of limited forecasting work, but usually these routines are part of a general statistical package.

  - The more equation types that are available to fit to a set of points, the more the set of programs will be used.

  - Mating with curve-fitting should be a plotting program capable of the gross plotting of the "best fit" equation with the output on the CRT and/or the printer.

- The communications application area also falls into the "utility program" designation.

  - Users and potential users rarely mentioned this as an application area because these functions were:

    - Discouraged by EDP managers.

    - Transparent to the end user.

    - Not really required in the early days of corporate personal computer use.

  - Recent research has indicated that this will become an important concern to the central EDP group as personal computers increasingly become used as terminals in many applications.

  - Currently, when necessary, the personal systems connect to a front end that performs the services enabling communication with the host.

- Current systems do not have the capacity to individually handle the software for communications in addition to the application.

- The new IBM personal system will be SNA compatible indicating that IBM is placing some emphasis on the corporate market.

- As personal systems become larger, they will handle the communications work themselves.

- A certain portion will be accomplished in hardware, but there will be attendant software.

2.   GENERAL BUSINESS APPLICATIONS

- Since departments within a large company have many of the elements of a small business, some of the general small business applications can be adapted for corporate use.

  - Programs that track budgets and inventory are the most generally useful.

  - Accounting programs can be used in many departments depending upon the overall P&L organization of the company.

  - Pricing programs are useful in order departments, at division levels, or in lower levels such as product groups, depending upon the range of products and the nature of the industry.

    - The most useful general pricing programs are those developed for the various small wholesalers in an analogous industry.

B.   DEPARTMENT APPLICATIONS

- Accumulating each department's overall involvement with data processing into broad application classes emphasizes the point that departments within a company frequently use general business applications.

    - The usage found in the departments under study in this report is shown in Exhibit III-I.

- Personal computers, even though currently shared, are used for very personal or job specific applications.

    - Two people in the same industry, in the same department, with the same title, use their system for quite different applications.

    - The joy of the personal system is apparent when one can turn to this tool and quickly use it for some new job or problem that has just come along.

- Uses of these systems by department, then, can be misleading in that some applications cannot easily be applied to others in similar departments or industries.

    - The applications listed in the following section have been culled from the responses and are generally felt to be useful to others in similar job functions in other companies - sometimes within the industry and sometimes across industries.

I.   MARKETING DEPARTMENTS

- The marketing applications shown in Exhibit III-2 have been grouped by type across industry lines in broad functional areas.

EXHIBIT III-1

APPLICATIONS USE

APPLICATION	PERCENT OF EACH DEPARTMENT			
	MARKETING N:42	MANU- FACTURING N:16	PLANNING N:35	FINANCE N:39
Accounting/Finance	33%	6%	77%	100%
Marketing/Sales	100	0	57	13
Scientific/Engineering	7	38	26	5
Personnel/Payroll	12	13	20	31
Purchasing	7	19	9	0
Inventory/Control	19	69	29	18
Order Entry/Billing	29	44	11	15
Modeling/Forecasting	33	38	91	36
Cost Systems	19	50	26	28
Performance Measurement	29	31	43	21

EXHIBIT III-2

MARKETING DEPARTMENT

PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
● Planning	
– Market Forecasting	Primary
– Market Information Systems	Primary
– Purchase Analysis	Secondary
– Management Graphics	Primary
– Market Research	Primary
– Inventory Analysis	Secondary
● Customer Services	
– Billing and Collection	Secondary
– Sales Proposals	Primary
– Customer Service Analysis	Primary
● Department Management	
– Personnel Status	Primary
– Cost Systems	Secondary
– Budget Planning	Primary
– Scheduling	Primary
● Industry-Specific	
– Centralized Information System	Secondary
– Sales Services for Agents	Primary
– Personal Financial Services	Primary
– Pension Administration	Primary
– Tax Services	Secondary
– Estate Planning	Secondary

- They have been listed by the respondents according to their usefulness to the individual job function.

- There are departments within marketing that do not interface with the customers in the same fashion as many of the respondents do.

  - Similarly, the amount of quantitative planning done within marketing varies considerably and so will the importance of planning applications.

- Certain industries, banking in particular, have marketing groups charged with selling large bank services to smaller banks.

  - Currently, the very largest of the banks are packaging specific applications on large micros or on specially designed microsystems (fail safe, for example) and marketing the hardware, software, and service as a package to smaller institutions.

- While such an application is not a "personal" use it is an application on a microsystem and it is in use by marketing groups.

  - It is also a way of adding value to a basically inexpensive product and, if the total package is leased, of providing continuing income.

- Within the general categories listed in Exhibit III-2 are very specific individual needs that are in part being satisfied by using a personal system.

  - For example, customer service analysis would include an analysis of teller queues on a bank floor as well as an analysis of customer satisfaction with a service department's service.

2. MANUFACTURING DEPARTMENTS

- Manufacturing department respondents felt that they had the freedom to purchase any tools necessary to increase productivity in their particular area.

- Therefore, there was less hassle from EDP management, if EDP even found out, when these respondents purchased personal systems.

● Production control managers found that a small system could be used to model a portion of the shop floor and production could be scheduled to maximize the desired variable on a daily basis, if necessary.

- In one company, the program was written in BASIC by the head of production control on a small personal system. When the application proved successful, four identical systems were purchased and sent to each of four factories with the identical program to do the same application.

- Like a standardized language, variations grow with time. The systems in each of the factories are being used for different applications peculiar to each production control manager in the individual plants, but corporate production control has not permitted individual changes in the initial program unless the suggested change is approved by all four production control managers.

● Exhibit III-3 shows the variety of applications fairly well.

- Graphics applications were mentioned more frequently by manufacturing respondents than by any other department. While CAD/CAM immediately comes to mind, small personal systems are not yet capable of handling and manipulating three-dimensional drawings.

- However, there is a need for two-dimensional graphic programs in all industries that use patterns.

. Textile design (color).

. Clothing design and pattern-making.

EXHIBIT III-3

MANUFACTURING DEPARTMENT
PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
• Planning	
– Management Graphics	Primary
– Budget Planning	Primary
– Material Requirements Planning	Secondary
– Cost Modeling	Secondary
– Manufacturing Forecasting	Primary
• Department Management	
– Purchasing System	Secondary
– Inventory Control System	Secondary
– Performance Management	Primary
• Industry-Specific	
– Pattern Marking	Primary
– Paper Mix Calculations	Primary
– Shop Floor Control	Primary
– Operator Assignments	Primary
– Structural Analysis	Secondary
– Dough Mix Calculations	Primary

.		Carton design.

.		Forms layout.

.		Newspaper layout.

.		Advertisement layout.

.		Sheet metal patterns.

● In manufacturing departments, productivity improvements are more easily measured than in other departments within a large company.

  - Programs and systems that will measurably increase productivity will be more easily sold than some ancillary programs.

3.	PLANNING DEPARTMENTS

● Planning department applications are very dependent upon the level of the department within the large company.

  - A corporate planning department that is financially oriented will have different needs than a planning department in the manufacturing division.

● Economic forecasting and corporate modeling were high on the planners' list of applications that they would like to do within their departments, but at this time it is not possible due to the available memory size and available programs.

  - Economic forecasting using global variables plus corporate data is most frequently accomplished by using an RCS company with its appropriate data base.

- There are questions concerning the approach used by some of the respondents in using personal systems for some of the applications shown in Exhibit III-4.

    - Some of the applications were limited versions of broader applications using the same name and implemented on much larger machines.

    - The abbreviated version, however, provides sufficient information in a timely manner so that the user is very satisfied.

- Planning groups are heavy users of statistical packages and are generally familiar with their use and applicability.

    - User friendliness is not as important as is an integrated set of programs that use common files such that the output of one program can be used by the other where appropriate.

4.   FINANCE DEPARTMENTS

- Recent INPUT studies have indicated that no matter how strongly a large company strives to keep all data processing in-house, finance departments usually do financial and economic forecasting using the services of various RCS companies.

    - This occurs because much of the data used are non-company specific but reflect national and international conditions, which are available in the RCS company's data base.

- The applications shown in Exhibit III-5 are those that require corporate data primarily.

- Finance departments are heavy users of computers in general and have come to rely on the large systems.

EXHIBIT III-4

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PLANNING DEPARTMENT
PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
Planning	
– Budget Planning	Primary
– Supply Cost and Inventory System	Secondary
– Capital Investment Program	Secondary
– Internal Pricing System	Secondary
– Quarterly Financial Planning	Secondary
– Management Graphics	Primary
– Capacity Planning	Primary
Corporate Systems	
– Hardware Performance Measurement	Primary
– Programmer Performance Measurement	Primary
– On-line Labor Reporting	Secondary
– On-line Routing	Secondary
Industry-Specific	
– Cash Flow Analysis	Primary
– Shop Flow Control Dispatching System	Secondary

EXHIBIT III-5

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FINANCE DEPARTMENT

PERSONAL COMPUTER APPLICATIONS

APPLICATIONS	IMPORTANCE RANK
• Planning	
– Earnings Models	Primary
– Stock Options Planning	Primary
– Management Graphics	Primary
– Job Schedule Analysis	Primary
– Payroll Forecasting	Primary
– General Statistical Analyses	Primary
– Profit Planning	Secondary
– Working Capital Analysis	Secondary
– Sales Analysis	Secondary
• General Financial	
– Asset and Liability Accounting	Secondary
– General Ledger Summary	Secondary
– Budget Control	Secondary
– International and Domestic Consolidations	Secondary
• Industry-Specific	
– Real Estate Accounting	Secondary
– Portfolio and Loan Officer Reports	Secondary
– Secondary Market Mortgage Information Analysis	Secondary

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- Central EDP departments frequently report to the finance department, or did in earlier days.

- Finance departments are still strong supporters of centralized information systems.

• Although small groups with finance departments have personal systems, the applications of primary importance are nonmainstream functions such as:

  - Stock options planning.

  - Earnings models.

• Other high-priority applications are generic in nature and are used on an ad hoc basis:

  - Management graphics.

  - Statistical analysis programs.

• The secondary applications are usually successfully implemented on central systems but have been attempted for smaller divisions or separate subdepartments, such as mortgage loan accounting on the larger personal systems.

• In general, it will be a challenge to find financial applications to justify a personal system purchase that are not calculator oriented rather than computer oriented.

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IV SOURCES OF SYSTEMS, SOFTWARE, AND SERVICES

IV   SOURCES OF SYSTEMS, SOFTWARE, AND SERVICES

A.   SYSTEMS

● A bewildering number of different types of organizations are selling personal computers, as shown in Exhibit IV-I.

- Theoretically, the corporate end users could obtain their systems from any of the sources.

- Realistically, the choice of vendor is much narrower, constrained by:

    . The user, who will not make the effort to go to all of the sources.

    . The vendor, who may not know how to reach the end user or who may be intimidated by a "large corporation."

    . Corporate purchasing practices of dealing only with other large financially stable organizations.

    . The EDP department who may sanction only a limited number of systems as being "acceptable" to the central system.

EXHIBIT IV-1

SOURCES OF PERSONAL SYSTEMS FOR THE CORPORATE END USER

LARGE MAINFRAME MANUFACTURER

MINICOMPUTER MANUFACTURER

MICROCOMPUTER MANUFACTURER

PERIPHERAL EQUIPMENT MANUFACTURER

SYSTEMS HOUSE/ TURNKEY VENDOR

USED COMPUTER DEALER

THIRD PARTY LEASING COMPANY

FACTORY-OWNED DEALER STORE

COMPUTER RETAIL STORE

CONSUMER ELECTRONICS STORE

COMPUTER DISTRIBUTOR

ELECTRONIC INDUSTRIAL DISTRUBUTOR

EQUIPMENT RENTAL COMPANY

CORPORATE END USER

3RD PARTY MAINTENANCE COMPANY

OFFICE MACHINE DEALER

SERVICE BUREAU

REMOTE COMPUTING SERVICE COMPANY

SOFTWARE VENDOR

MANUFACTURER'S REPRESENTATIVE

COMPUTER CONSULTANT

INTERNAL EDP DEPARTMENT

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- In the original research, all the under $10,000 systems were purchased at a local store while all the over $10,000 systems were purchased directly from the manufacturer.

- The trend toward purchasing all corporate systems directly from the manufacturer is accelerating because:

  - Personal computer manufacturers are establishing marketing groups to sell to large accounts.

  - Large companies are making bulk purchases of systems.

  - Major mainframe companies have entered the personal computer marketplace and they are selling as they always have - directly to the large companies.

- Users and potential users have expressed a desire to go to one source for their systems - the EDP department.

  - The consistent attitude among corporate users is, "The EDP group is chartered to provide information processing services and so if I need a system I should be able to go to EDP to get one."

  - EDP departments, as mentioned before, are becoming more involved with personal systems, certainly corporate EDP is aiding and abetting their use, but few EDP groups are actively marketing personal systems within the corporation.

B.   SOFTWARE

- Being consistent people, users would prefer the software for the personal system to be supplied by the EDP department along with the system.

- Users would like a complete package that would be immediately useful.

- However, users also recognize that having EDP supply the applications program would not be helpful if the problem is an EDP log jam.

• In the original research, over 5% of the personal system users had written their own programs or someone else within the user's department had written them.

  - Thirty-two percent had the applications program written by software package vendors, custom software houses, or software consultants, as shown in Exhibit IV-2.

  - In spite of user preferences, the EDP department, 18 months ago, provided none of the applications programs.

• Currently, more packages are available for personal systems than were available to users in early 1980.

  - How many of these packages will meet the particular needs of the corporate user is unknown.

  - Corporate users have no efficient way of finding packages that might be useful to them.

  - Corporate users would prefer to have EDP evaluate the packages and give them the accepted one. This again throws the burden back on the overburdened EDP group.

• Packages solve the "too personal" software problem mentioned by a few companies as a caution in using personal systems.

  - A user writing his own program makes it fit his approach to the job. Such a program may not be useful or even understood by the next

EXHIBIT IV-2

SOURCES OF APPLICATION SOFTWARE
FOR PERSONAL SYSTEMS

APPLICATION	SOFTWARE SOURCE
MARKETING DEPARTMENTS	
Leasing Calculations	User
Sales Proposal Word Processing	Software House
Inventory Control	Systems Vendor
Modeling	Software Vendor
Market Share Analysis	Software Vendor
Sort	Software Consultant
Letter Writing	Software Consultant
Word Processing	Systems Vendor
Group Health Rates	User
MANUFACTURING DEPARTMENTS	
Machine Control	User Department
Modeling/Forecasting	User Department
Scheduling, Planning	User
PLANNING DEPARTMENTS	
Statistical Analyses	User Department
Experimental Analyses	User Department
Inventory Control	Software Vendor
FINANCE DEPARTMENTS	
Modeling	User Department
Graphics	Systems Vendor
Data Entry	Systems Vendor
Credit Sales	Summer Student
Payables	User Department

person filling that function, and the program may not be useful to the originator in his next job.

- A package is usually produced in more general terms so it will be salable to a wide audience. The package has a better chance of being useful to more than one person filling a particular job, and so the investment will not be lost, as it might be with a very personal program.

● Systems software is generally provided with the system, though these programs may not have originated with the systems manufacturer.

- The operating system (if one is available) is supplied by the system manufacturer even though it was written by a software house.

- Basic utilities such as file manipulation routines, screen manipulation programs, and graphics presentation programs are usually supplied and purchased separately from the system. The systems manufacturer may supply them, or the user can go to a variety of other types of vendors such as those listed in Exhibit IV-I.

● The early corporate users of personal systems were more computer knowledge-able than the general corporate user should have to be. These early users had minimal difficulty in modifying applications packages to more precisely fit the intended use.

- New users will expect the package vendor or originator to make modifications to the package for particular uses. The user generally is willing to pay reasonable fees, consistent with the price of the system and package, for such modifications.

C.   SERVICES

1.   TRAINING

- Training in the use of these personal systems varies widely, and its perceived adequacy is very dependent upon the end users' previous experience and apprehension level with respect to computers.

- The training received also depends upon the size of the sale and who is doing the buying.

    - If the company EDP department purchases a number of systems to place in multiple locations, then EDP personnel and key departmental user personnel receive sufficient training so that they can support the system and train others within the company to use the system fully.

    - The purchase of a single system usually comes with manuals. Instruction is generally available, if needed, for a fee. Some users in the past felt these courses should have been more complete.

- The selected comments given in early 1980 on training, shown in Exhibit IV-3, are grouped by system to facilitate comparisons between "adequate" training and training considered lacking.

    - It is interesting to note that similar sources of training on similar systems received vastly different adequacy ratings.

- Training approaches must be developed that are totally responsive to the background and learning rate of the person being trained.

    - One-on-one training by the system itself, if properly done, is the most responsive training method.

EXHIBIT IV-3

COMMENTS ON TRAINING PROVIDED

SOURCE OF TRAINING	HOURS PROVIDED	COMMENTS	COMPUTER SYSTEM
Manuals	-	"Adequate"	Apple
Computer Store	25 Hours Ea. 2 People	"Adequate"	Apple II
EDP Department	32 Hours/Agency	"Inadequate, EDP trainer wasn't knowledgeable"	Datapoint 1800
EDP Department	12	"Adequate"	Datapoint 1800
Manuals	-	"Inadequate – 8 More Hours Needed"	Datapoint 1500
User	3 Hours/Person	"Adequate"	HP 85
Manuals	-	"Adequate"	HP 85
Manuals	-	"Inadequate – 12 Hours Needed"	HP 35
Vendor	8	"Adequate"	IBM 5110
Manuals	Continuing Process	"Course on BASIC Would Have Been Nice"	IBM 5110
Vendor	40	"40 More Would Have Helped"	IBM 5110
Manuals	-	"Adequate"	TRS-80
Manuals + EDP Department	12	"Inadequate"	Wang PCS-2
Software Vendor	2	"Adequate-Will Also Provide 4 Hours/New Person"	Wang 2200
Software + Hardware Vendors	20	"Adequate for 2 People Who Will Then Train Others"	Wang 2200

- Overall, three-quarters of the respondents found the training they received adequate.

    - Virtually all the formal training was done in a standard classroom environment.

        . In 10% of the cases, some training material was presented on the personal system itself.

        . One vendor trained the initial few people. New people learn by means of audio cassettes.

- During the next five years, the typical end user will need formal training in the use of personal systems if a positive attitude toward the new tool is to be generated.

    - Inadequate training given to a person who is apprehensive anyway is the quickest way to guarantee that the system will not be used.

- The amount of training necessary will vary depending upon the turnkey capability of the total system.

    - The more turnkey, the less training in the use of the system; but perhaps more training is required for those who must understand the system fully.

    - If the user is going to program the system and has no experience with computers, then two language courses will be required.

        . The first course is an introduction to the language and computers, and how to use the tools for useful work.

- The second course should take place sometime after the users have worked with the system for a while, and should be very specific to their problems and their applications.

- Sixty percent of the respondents expect the vendor to provide the training initially.

  - This is not the hardware vendor, but rather the vendor who negotiates the sale to the end users. This could be a systems house, the hardware vendor, or the hardware vendor plus the software vendor.

  - Twenty-one percent expect the training to come from the corporate EDP department, and 15% expect to be self-taught or trained by others within the using department.

- As the EDP department becomes involved with personal systems, users will expect training to come from EDP.

  - Users will not care if EDP trainers teach or if the job is contracted out to a training company.

2. MAINTENANCE

- Reliability in both hardware and software is a key selling attribute of these systems, so the active pushing of maintenance contracts and software services fees will be detrimental to the growth of the systems in the corporate milieu.

  a. Hardware

- Corporate users of personal systems do not want to be bothered with maintenance.

  - The problem should be handled as telephone maintenance is handled - one telephone call brings the repairman.

- Users would like to call EDP and let EDP get maintenance wherever they choose.

- Users would prefer a system swap in order to minimize the inutility of the system from their point of view.

● Users do not care if depot maintenance or on-site maintenance or any other popular form of maintenance is provided as long as it does not involve themselves.

- Corporate users cannot be expected to box a system and ship it anywhere.

- Corporate users cannot be expected to swap boards.

- Corporate users can only be expected to call "maintenance" and "maintenance" can do the rest.

b.   Software

● "Laissez-faire" best describes the users' attitude toward software maintenance.

- If the system is running for a particular application or limited set of applications, then the users are satisfied and have no interest in a new version that has a corrected bug that they did not use anyway.

- Certainly, if a purchased application package has a bug or if a newly written program uncovers an operating system bug, the user will accept a bug-free version of the program at no charge.

● Personal system users in a corporate environment, in general, are not going to subscribe to a software maintenance program for a fee.

● Software maintenance is important in environments where the system con-
tinually grows.

- Personal systems are sold in the full configuration necessary for a set
of applications and individual system growth will be minimal.

- If a larger system is needed, usually a new system with the latest
features will be purchased and the old system will be passed on to a new
user.

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